Jon: First, it would be good to go into the circumstances surrounding the development of the Rutt/Etra.

Steve: Bill Etra was an artist-in-residence at NET'S Lab. This is going back an incredible amount of time, back before we moved to New York, so that would be about six years ago. He was working as an artist-in-residence at the Lab. He'd been working with the Paik machine and discovered some of the limitations it had, which were to a great degree because it was AC coupled, which is to say you couldn't take the image and put it in the upper right hand corner and leave it there. You could only sort of modulate it into the upper right hand corner and it would come right back. And other factors on it. He was sort of convinced that something could be done to make it better. And I had been fooling around with these strobe lights that I was building and looking to see if they could be used for video. We were using them for other things. Huge tremendous strobe lights that put out an average of 3,000 watts.

Jon: You were building these for personal purposes or for commercial?

Steve: Commercial. We were using them to inspect things like cold rolled sheet steel while it was on a mill and all kinds of funny stuff like that. I was interested in seeing what it could do in video. So I borrowed Bill's half-inch machine and I was noticing that it would slow things down: It wouldn't slow things down because you could sync it up to vertical and you could examine something a frame at a time. If you wanted to see why your milk carton bottling line wan jamming up you could put this thing on it and then when it jammed up you could go back and inspect it and you'd get these very clear pictures and you could see that what actually happened was that this gear almost grabbed it but didn't quite and when it didn't grab it, it fell over there and that thing slammed into it and . . . So, Bill was looking at that and he wanted to play with the strobe with some color stuff so we brought the strobe down to the Lab. And while I was down there he explained to me this Nam June thing and I'd never seen one before.

Jon: You had not been involved in video previously?

Steve: No, I'd not been involved previously, even vaguely. I'd been involved in audio a lot but no video. So he showed me how the thing worked and basically it was a TV set with various systems to add external forces to the deflection by either injecting it into the already existing deflection circuitry and also through additional coils that were put on the thing. They (I?) used audio oscillators for this and other funny stuff. And you rescanned it. It seemed like a neat toy and it made neat pictures. Bill wanted me to work on the thing. So I said, "Yeah, OK, maybe some day." He came up and got me a grant of $3,000 to develop this device and we set out to do it and thirteen thousand dollars later we finished it. At that point I was committed to this industry, if for nothing else to get my ten thousand dollars back.

Jon: The grant was from the TV Lab?

Steve; Yeah, from the TV Lab. It was actually an artist-in-residence, because they didn't have any hardware money available. Anyway, they got a good deal and we built this synthesizer and gave it to them. The one that's still there. And I tried to buy it back from them and they won't sell it back.

Since they've now bought a much newer one, so they really don't have a lot of use for the old one. So, that was the first unit; and we really didn't know what we were doing back then. We built it, and we modified a TV set the same as Nam June did, only we were a little more sophisticated on it. The next generation we built from scratch.

Jon: Well let's stop for a second. The features this first machine had? How does it differ from the production models?

Steve: Mostly in sharpness.

Jon: Because of the tube? You had not found the Panasonic?

Steve: Well, more than the tube, the new unit in fact uses a smaller tube, but it's in the circuitry that's running the thing. For example, the new ones have the ability to control the intensity of the display at any instant. In other words, with the same speed that you can control all the other parameters whereas this one didn't. So if you're (inaudible) you could compensate and this one didn't really have much ability to scan, the scan was very non-linear. It was good for producing patterns, but it wasn't good for doing logos.

Jon: It did have a video input? An external video input.

Steve: Yeah, they all had external video inputs.

Jon: Did it have dual trace?

Steve: No, we didn't figure that one out yet. Dual trace actually came as the result of playing with that one. We had multipliers in it and one of the things people started doing very quickly was taking a multiplier-- actually two multipliers, since there were two available-- feeding a square wave into them through a couple of diodes so that one of the multipliers would see a positive voltage and then it would see nothing, and the other sees just the opposite. Syncing that up to vertical we found, that you could put two different wave forms into two different halves of the image. At the point which I realized that people were doing that, because at this point I hadn't actually started using my machine (my motto back in the old days was "I just build 'em. I don't fly 'em," and in fact I didn't start using them until I stopped building them. Other people were working with the thing, John Godfrey and whoever else was around the Lab, and they discovered this: all that is is a dual trace oscilloscope. It's been around for years. All you have to do is put in a couple of switches in, you didn't need anything as fancy as multipliers, and that was it. There were three models that weren't dual trace that were built before we switched over. In fact that, over there in the corner, is the first dual trace unit ever built, and that had an auxiliary plug-in board, it hadn't become an Integral part of the system yet. That was the last pre-production run and then we made a run of them, a whole bunch of them, identical.

Jon: So those are at the Ontario College of Art?

Steve: No, they have the last tale of the thing. That I think was the last machine I built. What we did over the years was raise the price and improve the quality, we mostly raised the price, but we never made money on it in the old days and we figured . . . it's the old story, if you're building it for five dollars and selling it for four dollars, you can make it up in volume. So we decided (what) we had to do was raise our price. So we doubled the price or something and nobody could afford it any more. So we built this stripped down version and we sold one to Ontario. It's an interesting device because it had all . . . it had a lot of the controls similar to the older units, but it didn't have the dual trace. But it had the picture sharpness of the new ones and it had the intensity control of the new ones and it had a few . . . Later on we discovered a couple of circuits that were usable to . . . One of the problems is burning the tubes. We have several circuits that (something like "tried to") compensate for intensity were like crowbar circuits that just crashed off when it got where it should do that. So the Ontario one would have that and it had a few other things. But that was very recent. I'm trying to think of the details on that one. I think there were new boards made up for that one, too. The one before that had dual trace. That one went to the Art Institute of Chicago. That was I think the last dual trace one we built, and then we pushed the price way up and that was the end of the creative market for the thing. They just couldn't afford it. Had we got more orders from industrial people we could have built them at a lower price, but for the most part building them one at a time we couldn't afford to do it at those prices. And we eventually stopped building them, it, was just too much of a hassle.

Jon: What control modules did the original models have?

Steve: The one at NET didn't have modules. That was before we discovered modules.

Jon: It's simply a solid front panel?

Steve: Yeah. The early ones had about the same ones as the later ones. One of the things that hasn't changed is the modules, which has become sort of a joke for one thing because this waveform generator never worked right. I shouldn't say it never worked right; it never did all the things we knew it could do. In the early models it was sort of OK, because it was this early state and nothing worked right back in those days. We used to have a standard procedure that if something didn't work, that was the way it was supposed to be. And if no one else was making it, it wasn't a problem and it all worked better than what had been here before. But we never changed any of this stuff. Never changed the modules at all. The only thing we ever did was put power supplies on the modules—each one—so that you could line them up and plug them into the machine.

Jon: So that they were electronically identical.

Steve: Yeah, electronically identical. We then found out the power supplies were the weakest link and they used to blow out all the time. This is before you could buy three-terminal regulators. We had an integrated circuit. I mean two Darlington transistors on some of the bigger ones, just regular NPN-PNP pairs on the smaller ones to make the plus or minus 15 volts that they run on. And we found that the power supplies blew out certainly 10 times more than anything else blew out. If you had ten module failures, nine of them were power supplies. So, the later models we pulled that off, because it wasn't worth the hassle.

Jon: I see, but the original complement of modules as provided, to NET were . . .

Steve: It's almost the same as what's on that machine. Always two waveform generators, some people have bought more. At least one summing amp. At least one ramp generator, except that Vasulka and the Art Institute and Australia got the ramp programmers so you could do more than one move. We should have built more of those things and rammed them down people's throats, because people didn't want to pay extra for them, but it was really limiting when you didn't have this stupid thing. So we had that. That's got a joystick on it (referring to the machine in the room) which we built for a few but that wasn't a standard module. And then we had a module with a bunch of diodes in it that was good for something: it mainly plugged the extra hole that was in the unit up. When you had two waveform generators a summing ramp and a ramp generator there was an extra slot.

Jon: What is that module, the joystick?

Steve: That's just a joystick. It's an X, Y, Z control for anything you want to use it for. It was originally designed, Etra thought it would be used as an additional thing, and he may in fact have used it for that. What I've used it for had been simply how to control any three parameters with one hand.

Jon: It's a manual interface.

Steve: Yeah, it's a good device, because it's incredible how much control . . . you always need to do something with your other hand, so you've always got one hand available and that gives you control over that. You can zoom something out, you can flip it upside down, you can blow it apart: any of those three anytime you want with very good control. We put integrators on the output so that if you move it fast it makes a nice smooth move.

Jon: How was it that you came to this particular approach to designing this tool, the scan processor.

Steve: Oh, the Paik unit (??) . . . We totally just expanded on that. But we didn't in fact, know where it was going to go when we started. We didn't understand that you could do this much with it.

Jon: So you had sought to make, in essence, a modification or an addition to the Paik machine.

Steve: It wasn't so much an addition as a modification. The main thing we did from the Nam June machine, well we did two things to the Nam June machine. One thing was the Nam June machine was built out of sort of surplus parts, whatever happened to be available he snuck in. If we wanted something that did something, we started from scratch and built it. So it was a little more refined and all plugged together and it looked prettier. The other thing is we DC coupled everything which had been AC coupled. That was the main thing. If I had to point to one change I did in the Nam June machine, it was the DC coupling because without that, you couldn't get positional movement, you could only get waveform distortion. You couldn't actually take something and slowly flip it upside down. Or flip it someplace and leave it there. That was the main thing. They were just all

refinements. You know, it was like resolution: how do you sharpen the picture? So we went to a higher voltage on the CRT . . .

Jon: And the fact that the machine was completely voltage controlled?

Steve: Well, Nam June's sort of was. The voltage control came pretty much from analog computers. Most of the modules we used were things that had been analog computer concepts such as multiplier, summing amplifiers, dividers, log functions (some of the units have log generators to compensate for intensity and other things). Pretty much just analog computer circuitry. Nam June didn't really have all that much of that in it, but he could have. He actually could have bought it off the shelf because back in those days you could still buy analog computers. In fact, Vasulka had an analog computer for a while, if he ever got it working. Some weird old analog computer. The design came from that pretty much.

Jon: I see, but there was a specific demand, in a sense. An image perhaps or a kind of programmatic material that you and Bill wanted to make?

Steve: That Bill wanted to make mostly. I was just sort of listening to what people wanted and building it and Bill was one of the people that I was listening to a lot. And he was saying, "Well, what it really needs is a device to . . .”

Jon: To allow the Paik/Abe to zoom.

Steve: Yeah. That was the DC coupling. That was THAT. That was the first unit we built did that. That's an interesting point. That was the main difference between the two, which was simply the fact that we had the control which the other one didn’t have. The Paik/Abe can zoom but it can only zoom for about a sixtieth of a second and then it comes back, which makes an interesting pattern. But it couldn't zoom completely and it can't make smooth flips and it can't make a square into a pyramid exactly. It can do a lot of the other things that we can do with our machine. But those are the facts. And then as new people wanted them, in the early stages somebody wanted this and somebody wanted that, we built modules. That was the module idea. We were constantly trying to get the image sharper. We built a couple of units with bigger CRTs. Actually, the one we built for Australia which was really an outstanding thing, because we built a completely new CRT unit for it. The two previous too that, one of which is at NET now, were in their day pretty good. However, now we've managed to get about that resolution out of the small tubes. And probably the one up in Canada is just as sharp.

Jon: You were using a nine-inch tube?

Steve: Two of them had nine-inch tubes, the first one we built at NET and the second one we built is at Venezuela. But the nine-inch tube didn't particularly do anything better than this one.

Jon: How did you get involved with Etra?

Steve: I've known him for years. He and I sort of go back a long way, before he was in video as a matter of fact. _____ back then, but that was a long time back.

Jon: And you were involved in electronics?

Steve: I've always been in electronics.

Jon: I see, a childhood fascination.

Steve: Weird kid. No, Bill was in still photography then, before he got into video. I know he had a good line once, which was that he went into film for a while, he said, “the problem with film was that by the time you got it back from the lab,” he forgot why he shot it. That was his excuse for getting into video. He was also sort of the first kid on his block with portable video equipment back when it was brand new. And that got him going and got him interested in it. He was experimenting with a lot of oscillators and things. You know, colors and lots of crazy projects. So by the time I got tied up with him on this stuff, he already had a pretty good knowledge of what was going on. And we got working with somebody else too who had been working on this for years, and that was Sid Washer. I don’t know what he's doing now, but he had been working on building synthesizing type stuff for quite some time and had also figured out the DC coupling thing but hadn't quite gotten it into practice. He and Bill and myself and Greg Leopold were the original bunch of nuts.

Jon: So you were speaking with Washer while you were designing the Rutt/Etra?

Steve: Well, he was working for us, helping to design and building and everything else.

Jon: So who were the collaborators?

Steve: The first unit was built by me, Bill and Sid and a woman who, I don’t remember her name now, who worked for the telephone company wired it.

Jon: Liz Phillips?

Steve: No; it wasn’t anybody who’s around. It wasn’t anybody who’s in video. I was looking for somebody to wire mainframes, it was like . . . hundreds and hundreds of feet of wire with nothing longer than eight inches. Anyway, she came in and wired this, thing up and she met a guy here and split. Add that was the one at NET. And then Greg Leopold started working with us and he managed at the factory. Tom Zafian worked with us on some of the early units, did some wiring, and that was about it.

Jon: So, aside from you and Bill and Sid Washer, nobody else were collaborators.

Steve: and Leopold.

Jon: Who is Leopold?

Steve: Greg Leopold used to work for **Pectileinear ??** loudspeakers. He didn't collaborate in what the device should do as much as packaging and how the device should do its stuff. In other words, our problem was that we're going to add this unit over here which seems to be connected up this way which involves so much power which involves so much cooling which involves so much space. And he worked with us on packaging this stuff and getting it all together.

Jon: Is he in New York City?

Steve: Yeah, he's still around.

(short break)

Jon: Is there anything more you can tell me about the development of the Rutt/Etra?

Steve: Well, there wasn't that much involved unfortunately. We spent a tremendous amount of time doing it, but looking back it's hard to see what we really did.

Jon: There must have been an immense number of problems, like the deflection amplifiers, for instance?

Steve: Well alright, I'll take an area then. We had to build our own deflection amps. The first unit we built we used a Dynaco Stereo 120 deflection amp, and . . . it's really funny because all my friends have those things in hi-fi sets and every once in a while one breaks and because of my experiences there, I now know of every single resistor in the device. We used to blow the thing out about once every fifteen minutes.

(interruption)

Jon: So you were talking about problems with the deflection amps.

Steve: So we used to blow the Dynaco Stereo 120s out all the time. And then we started wiring them up ourselves with op amps. Actually, I think the first one NET got may not have had a Dynaco. I think we already built . . . Part of the Dynaco was that it was AC coupled, so we couldn't do enough with them. You could zoom with them, but you couldn't take the image and move it over to the left. Because it goes back to zero again with the AC coupling. So we started building it with an op amp and Darlington output transistors and eventually we went to higher voltage circuits. Part of the problem with deflection is that you have to have a lot of voltage and a lot of current at the same time from the same amplifier, which is a problem. Because something that can deliver 30 or 40 volts and can also deliver like 8 amps starts to look like a lot of power. And when it's delivering 8 amps, 30 volts are being dropped across the transistors. That's something like 50 watts cooking off there plus other losses. That was not even one of our bigger amps. Some of the bigger ones were 500 watts. So we started building them, and that was like one major project.

Jon: Were there any influences or sources that would contain this information?

Steve: Oh yes. Eight zillion servo circuits in books. DC servo amplifiers that only needed to be run up in frequency. So we went through them to see what we could do to raise the band-width on the thing, because servo circuits, they only take a pretty low bandwidth and all that stuff had to be pretty high bandwidth.

Jon: But in some sense, the parameters of all your circuits were in the public domain?

Steve; Well, actually, the books that we built from were mostly the Motorola book and a little bit of the National book. I had this big Motorola book, from which we discovered the multipliers that we used and other stuff. Pretty much put everything together from there. So the circuitry was around. You'd look up an amp and it would have eighteen different circuits on how to use it, how to raise its power, how to raise its speed. None of which worked, of course. Half the stuff in the book was always screwed up. You know, you built it and then you de-bugged it. We went that round. Originally for our multipliers we were using a multiplier that was an entire multiplier in a chip. But it was noisy, and noise in multipliers was wobbling on the lines. So then we switched over to a Motorola multiplier chip that wasn't a complete unit. It had a bunch of discrete stuff hanging out all over it, which took more parts but it was a much better item. Also, for awhile we bought multipliers from a company, which shall remain unnamed. I would say terrible things about them.
They were supposed to be very high precision and low noise and everything. They were a total disaster. We built one unit with them and everything was non-linear. We couldn't get a square. We put a grid on the screen and you couldn't tell that it was supposed to be that.

Jon: How did you arrive at the design of your oscillators?

Steve: They use the standard Intersil8038 that the rest of the world used back then. And I basically just designed the thing one night from Intersil literature. They didn't have provisions for triggering the thing so we had to add a circuit to do that. It wasn't a question of synchronizing. (???) You can't synchronize an oscillator unless it's a multiple of the frequency, where as these things will lock up at any frequency. You get that by triggering them and we had to build a little circuit that made the Intersil chip think that it had hit one or the other side of its oscillations that it would always start off from the same direction of this reset pulse, (skip a little elaboration here) So we designed it one night sitting on the floor of my living room and we breadboarded it. Sid did the breadboard on it. And we debugged it, and then we put it on a card and we always said we were really going to do a number on it someway, and we never did. And that was the oscillator. And what it does is, it basically does everything really well. In a free running mode it's not very stable. Probably could be more stable, but we don't recommend using it for that. Even myself, I have an old vacuum tube audio oscillator, which I use when I want to synchronize something. It's pretty solid. But for triggering the thing it worked very well, because you can trigger it on vertical and horizontal and it locks on there forever. And the multiplier on it, because the voltage control output is the same multiplier we used in the earlier units, it was the little one in the can, the complete unit, which was also an Intersil, the 8013. In the later units it was the Motorola. It's all modular construction like the rest of the thing. There is this one card that's an oscillator, and then there are four cards that are summing amplifiers. We made this one summing amplifier card and use it everywhere. And then there's one card, which is a multiplier, and you see that little thin one in the old ones and they're big fat ones in some of the new ones.

Jon: To change the subject slightly, I'm curious how you came up with . . . how you envisioned the capabilities of this machine and so derived this particular set of modules which are in some sense standard to you, like diodes; summing amps, two oscillators, ramp generator and so on. As well as how you arrived at the basic parameters of control.

Steve: OK that was pretty much obvious. That's really all it was. Bill had always wanted to zoom, so we had a depth control on it. TV sets have height and width. Oscilloscopes have position, so we had position. Mainly because _____ whatever was around. Intensity, we immediately discovered as being necessary. The first time we zoomed the thing down to a dot. The one at NET does not have intensity control. Basically it has your TV set brightness control. We hadn't voltage controlled it. So the first one we built didn't have the ability to do zooms too well. The later models had not only the intensity control but also compensation. We did a height times width times depth multiplication. The horizontal center, we discovered—this is an interesting thing—we spent a lot of time working on it because **?? (misplaced original!!)boards? that shifts the phase of the synthesizer . . .** in relation to the phase of the video. And so it could do like a theater marquee effect. You can roll the video image through it. That we just dreamed up. It was quite a trick to build it, because you had to blank the image so that it didn't come back on the other side and that was tricky.

Jon: Why did you feel the necessity of building this function?

Steve: We tried to do theater marquee type things where you could roll an image through and we did it by moving the graphic but that was never satisfactory. It's the same with rotation. We developed a little bit of rotation stuff. But in that case it's easier to move the graphic, put it on a turntable . . .

Jon: Just to get this down on tape, you were the prime designer of all of these systems?

Steve: Yes.

Jon: Were you in some sense the specifier of the functions of these machines?

Steve: In some sense. But in a lot of sense other people specified what they wanted to do.

Jon: So that there was a certain commercial demand to come to you and say "I want it to do this."

Steve: It was not necessarily commercial, it's as much creative. Remember, I wasn't using the machine myself at that point, so I didn't really know what the thing did. It was quite a while after I stopped building them that I became proficient in using them.

Jon: When a creative, person came to you, do you remember some of the dialogs you had about this or some of the issues that came up? .

Steve: If people would have problems with them. The problems they would have are that the tubes would get burned, it was that kind of thing. So we made devices to solve that problem. Other than that I think it was very vague. People would say that they hooked up their toaster to the thing and it did that and could we build a module to do that, so we built then a toaster module to do that. That's about the level the thing was at. We built the audio interface that way. People were modulating things with audio.

Jon: I've never seen that, by the way.

Steve: All it is is an envelope generator like from an audio synthesizer. It just takes a signal in and you can vary the attack and the decay times. It rectifies the signal, amplifies it and rectifies it, charges a capacitor . . . actually doesn't change a capacitor it was an integrator with a variable discharge rate on the thing. And you can set it . . . It had a cute thing that we came up with. Around the integrator, if you want to vary the time of integrating a variable capacitor, all yon vary is the input voltage. Since we were both charging and discharging the thing . . . you know how an op amp works, you've got your input and your feedback resistor so if your input resistor is 10K and your feedback resistor is 10K and you had a 1 mike capacitor across the thing, you'd have a certain response time. If your input resistor was 100K and your feedback was 100K, your response time would now be 10 times longer. It would be 10 times more damped. Now what we did was we used a ganged pot to vary those two in the same ratio so you could vary the attack and decay time of the thing without affecting any other parameters on it, which were like its gain, etc. That was a good module, we did a lot of stuff with that. I've used it a lot, in fact, here . . . (indistinct)

Jon: Do you make tapes?

Stove: Yes.

Jon: I've never seen them.

Steve; .You probably have, did you ever watch "'The Edge of Night?" We did the opening.

Jon: Do you make tapes not for commercial work but for your own purpose?

Steve: A little bit. I'll put up one tape, I'll show you a tape that I did. I haven't done a lot and I haven't done anything with other people.

Jon: And so when you began this there was no question of art involvement in any sense. It was all electronics and commercial functions.

Steve: Oh yeah, there's still no question of art involvement. I'm certainly not an artist, under any stretch of the imagination by professionally accepted standards, I guess. I mean I create with the thing because I know how it works electronically. And I'm able to create stuff that I've passed off as art. Some of it for considerable amounts of money considering what it was. But I wouldn't call myself a creative artist even though I create stuff with it. I do it more like a technician knowing what the machine can do and knowing what somebody wants done. And a lot of the stuff that has

been created with this stuff that people call art. I'd also put into the same category as the stuff I do as a technician. Because I don't think somebody walking over to his TV set and turning the horizontal hold off and photographing the: screen constitutes art. But neither does a pile of cement blocks at the Metropolitan Museum of Art constitute art. I have a pile of cement blocks in the back which I'm considering also selling for $10,000, but nobody wanted to buy them yet. I also have a pile of plasterboard, which I'm going to put out as soon as the cement blocks are sold. By the modern standards of art, I'm sure I'm an artist. By other standards, I'm sure I'm not, including my own. But I'm a damned good technician and I can crank out pretty images, but video art is a pretty vague field.

Jon: What are the total products of Rutt Electrophysics?

Steve: Right now we're doing TV production, which is one of the products.

Jon: You're no longer making?

Steve: Oh yes, we're making stuff. Well, we still do custom stuff. For example we've been building colorizers for discotheques.

Jon: to be used with projectors?

Steve: Yeah. (brings the front panel) I have to confess there's some bit of commercialism there. We call the thing, instead of a colorizer, a video synthesizer, which helps it sell.

Jon: Siegel called it that also.

Steve: A lot of people call anything a video synthesizer. We sort of felt that our device was and we decided to sell out to the administration and we called this one that because they would buy it and if we called it a colorizer, they wouldn't.

(break, while we discuss the device: most not relevant to immediate concerns—commercial device—except for following)

Jon: But the quantizing functions, why did you take this particular approach?

Steve: The quantizer? Oh, because you had control over it as opposed to I and Q. Because you don't have the optimum control over it. In other words, someone says, "I want that shade of gray to be that shade of purple." You can't do it. Everything affects everything else. You take these four levels and you adjust one and nothing happens on the other levels. Totally rock solid.

(short break)

Jon: Other products?

Steve: Well, the repositioner is a thing that takes an already recorded image and moves it anywhere on the screen. For example, if you had a mortise shot on the lower left and you wanted to move it to the upper right this device would do it very easily.

Jon: Will it compress the image? .

Steve: No, it won't compress the image. For seven thousand dollars you get a device that moves it. For another seventy thousand dollars we'll tell you where you can buy one to compress it or we'll go out and buy one for you.

Jon: Have you sold these?

Steve: Yeah, they've been in production for a while. They're my design, I took out a patent on it.

Jon: Is it digital?

Steve: It's all digital, but it doesn't store though. What it does is that it digitally moves the sync a cycle subcarrier at a time horizontally and a line at a time vertically. And then it takes the video coming, out of the VTR or film chain or camera or frame store unit, as a matter of fact, it's in use with a frame store unit at CBS—and reinserts sync at the proper place and blanks the sync off in the wrong place. In New York here, who has it? There's CBS, Dolphin and EUE Screen Gems. There's a few others floating around and we have a bunch on order. Once we get this place together here we'll be manufacturing them. There are a few other things on the drawing board. When they come closer to reality, I'll tell you about. They'll come closer to reality by the time you're progressing along further, so check back with me. I don't want to say what I'm doing until I get it at least stuck together. Before the year's out, I'll have one more product out which is directed towards low-end video users. People that don't have time base correctors and don't have complex switchers, who just simply use editing.

Jon: Would you care to be more specific?

Steve: Not at this point. We're moving our market. The Repositioner is geared totally toward high-end broadcast. You can't use it unless you have at least two tape machines, three tape machines, two of which are either quads or have time base correctors. And there aren't too many facilities around to do that.

Jon: How do you decide what you're going to design and produce?

Steve: Well, the Repositioner came from synthesizerland. We always had this problem . . . I started first using the machine at EUE . . . we always had the problem of animating something in the wrong place or they wanted to move it or can you do something over here. And they'd come back and they'd say, "That was really good and now we want to do it again but down in the lower third because we have this title we want to put in, in the bottom." And you explain that you had no idea how you animated the thing two weeks ago and you were asleep and you don't know what your patch was and it took five hours and you're going to have to do it all again from scratch, and they

said, "Just to move it?" So we used to do **kines (??)** on an optical bench and we discovered that was ridiculous. And people were trying to fudge with the servos of VTRs, which is a horror to try to get them to move. And we just came up with the idea of doing it and built a breadboard.

Jon: So it came from the demand of trying to work.

Steve: And the need of doing something. And when we had the prototype we showed it around. One of those we showed it to was CBS, not because we were showing it but because I needed it at that point. At that point, I wasn't tied in that tightly to EUE. I needed a place to screw around with the quad machines.

Jon: Could you say something about the commercial aspects of the colorizer?

Steve: The first thing is that we never designed the thing for the video market, past the first units. The first units were designed for the video market. This thing that you're looking at here was designed for discotheques. However, it's probably better than most of the video ones around. It's soft edge, first of all, so you don't get any of that tearing and noise on the edges. And it's quite straight forward. You adjust the controls, they do exactly what it says. It's like taking a quadruple re-entry switcher and keying on all four busses with the ability to fade video in. And that gives you total control. I can, for example, feed a picture in there and make the gray one color add the black another color and white another color and still have a color left over for something else. Then they'd be very defined. Then if somebody said, "Make that outside frame a little more blue," I could just adjust it and make it a little more blue.

Jon: You were familiar with the Hearn machine?

Steve: Yeah, Hearn does more stuff than this. Well, the Hearn is the more sophisticated version of our colorizer.

Jon: As I understand what Bill and Bill say, you had been with Etra in contact with Hearn in specifying colorizer, matrix switcher, and so forth.

Steve: This was something in the early stages. It was a voltage control on how the stuff works. Yeah we worked together but Hearn pretty much did that thing on his own. It wasn't a joint effort like the Rutt/Etra Synthesizer. I'm sure he got some ideas from us, but Hearn . . . you know, what the device had to do . . . but in terms of how he did it I know he did it on his own. I know he doesn't use the same chips I use. He uses these balanced modulators, I can't think of the number. He got off on those things.

Jon: What was the reason that you called him?

Steve: Well we didn’t really call him to build it, we just knew him. He was always building stuff. I don't think, we were in any way responsible for him doing it although maybe we were responsible for him doing it in certain ways, but certainly not for the original idea.

Jon: As I understand it, correct me if I'm wrong, you called him to open discussions on him constructing a box with collaborative specifications coning from both you and him. And you had presumably known his colorizer?

Steve: He had already built stuff.

Jon: Yeah, he had to Model 200 colorizer, quantizer, keyer . . .

Steve: Which is still a good device.

Jon: That model had some problems.

Steve: Yeah, but compared to what else is around. It's really the only thing available in the video market, since we're not aimed to that market and we're not priced into that market. For what we sell this thing for, you can get more hardware from Hearn. Probably after you put it into a discotheque, drop it down the stairs a few times, smash the shit out of it and set it on top of a two kilowatt loudspeaker box, ours would probably stand up a little better. We've spent a lot of money in packaging the thing. If I had to go out and buy one for my studio I'd probably buy a Hearn because it does more.

Jon: What were the reasons for those discussions between you and Bill and Bill.

Steve: I don't remember specifically what the reasons were. Probably mostly from Bill and Bill, with Etra getting back to me on stuff. But I think mostly general feel of what's going on discussions.

Jon: I see, I got the impression that you had a need for a device that you thought he could build, and had in fact a use for it and wanted to commission this device?

Steve: We may have talked to him about building stuff at one point. He did some consulting for us at one point on a couple of things. Some feasibility stuff, colorizer stuff. But I think that was back when we (were) still doing synthesizers and planned to get into it.

Jon: You were never in any kind of contractual arrangement with him, other than the consultant stuff?

Steve: No.

Jon: I see, as both he and Bill tell it, your discussions were the genesis of the Videolab, in a sense, because (of) the requests for complete voltage control, which he was hesitant to do. The fact that Bill did not request oscillators, because he had so many, these kinds of things. The voltage actuated matrix patch field. That was Bill's specification.

Steve: OK, that was something that we put _____ to save us, and we had used plus or minus 10 volts on everything. Audio stuff used plus or minus five or zero to plus five.

(Rutt now distinguishes his machine from Hearn's in voltage levels, not necessary to transcribe)

Steve: T got the impression that everything he did he did pretty much on his own. I know he used different circuitry than we had originally worked out. I tried to get him to do stuff with some of the circuits we had, so there might be some more areas we looked into. We flopped around. But he'd already gone down his own road and it's very difficult to change your philosophy. Obviously we had the same kind of problem with this thing. If somebody else tried to build it using those chips, and I use that particular chip in everything I could; I never have any problems with the stupid thing. And these guys, it just drove them up the wall. It's a touchy chip but it does like a ton in one little package. You just have to feed it right.

Jon: I see, but your discussions with Hearn were towards whatever the fruition of designing some device that either Rutt in his productions . . .

Steve: My discussions never got that far. It was probably mostly Bill. The idea of marketing the Videolab and all that was strictly between the two Bills. I was not involved in that. I was pretty much out of that by that time.

Jon: Have you been in discussion, either formal or informal, with other designers or artists on the specifications of these things.

Steve: Not since stopping the synthesizers. We really sort of moved out of that field because we certainly weren't making enough money at it to warrant hanging in and we had been doing other electronic stuff all that time to supplement it. We decided that the thing wasn't going any place but that we would continue doing the other electronic stuff, On an ongoing basis, I talked to people about my synthesizers but I haven't gotten into any other heavy projects. The colorizer was not a heavy project. The colorizer was a good afternoon, very straightforward. I had used the circuitry that ended up in this thing originally as a keyer when we first put the studio together. And a chroma key unit, you know, a chroma key switch . . . we just assembled the package. The circuitry to make the color is almost off the shelf. Most of the switchers out tend to use the same digital chips to vary the phase of the subcarrier, which is a 74121 chip and is the recommended one there. And it's pretty much straightforward stuff. There's nothing innovative in it. The only thing innovative was our marketing, I think. We found this market that other people didn’t know existed, which is a discotheque thing, and managed to exploit it. _____ but only one unit we built ended up in the video art field. The rest of them are all in discos.

Jon: What other products has Rutt Electrophysics come out with that we haven't discussed? The RE-21.

Steve: I don't know if we ever really made one of. That was that whole same package. We just built a colorizer out of that. Most of that package never got built. It was just on the paper. There was that and there was an RE-3 synthesizer that never got built.

Jon: a scan processor?

Steve: A scan processor, yeah. We were looking to see if we could pick up a bunch of orders and run a whole bunch of them.

Definitely and only directed towards schools and such. It had a set of patch boards, a matrix, a pin matrix. It was a Selectro-board is what it was. It was stripped down a little bit, simplified, not quite as snappy and we were going to sell it for about three or four thousand. We didn't get enough orders for them. We never built it. That and that other thing were sort of the last stages of deciding that we weren't going to continue in that direction.

Jon: Have you ever thought about language to describe the effects or functions of these machines?

Steve: Well, we thought about it, but didn't come up with anything. Nothing intelligent, just explaining how it's done.

Jon: And so when you label a module, and you label it in standard . . . like bias and level and so forth?

Steve: Yeah. What it does. (short break here) There's really never been an operating thing that I know of. _____ I should have one because even right here I have a problem showing people how to use the thing. And that book only covers certain areas. It was written mainly not even as an operating tool but as something to allow people to understand what the device is. A prospectus.

(break here, discuss NET computer and that R Elect, had put some of the boards together and not much of it worked)

(I ask for materials and block diagrams, he offers them . . .)

Jon: This would be for publication.

Steve: Yeah, well this is just stuff I copied out of the Motorola book, so you're welcome to publish it. If anybody wants to build a synthesizer out of them, move power to them. And the same holds true for the colorizer. The device we use at the heart of the colorizer is described in the Motorola book- as a "high speed video switch" and anybody could build something with it. The only thing we consider proprietary is the Repositioner and we don't even consider it proprietary. The circuits are published, we just happen to have a patent on it and if anybody would like to build, it and pay us a royalty, we'd be glad to sit down and talk. I've never taken the attitude that we've built something and don't let it out. People might have gotten that idea sometimes because we'd built things and wouldn't give them schematics, but that's because the schematics didn't exist. A lot of stuff we built I just built. We even shipped a few things with proto-boards in them, including the colorizer as a matter of fact. (tells short story about protoboard. Mentions Joe Paul Ferrara who worked with Siegel on Proc Amp.)

Steve: Oh, Siegel worked on the original thing, I forgot that. He and Joe Paul came in and helped put this first version together . . .

Steve: They didn’t use the concept of the Siegel but the balance quantizing thing. I remember why Eric got involved in it. I had to build a PAL one for Australia, and they knew PAL better than I did. That was why they did it. Once that's been done, Joe Paul's been in and out a couple of times on other projects with us.

Jon: They only helped you put together the one for Australian TV.

Steve: Yeah, they didn't put it together, they just did the design on it. We just did the packaging at that point. At that point we were pretty heavy into packaging. For us to take a circuit and make edge circuit cards and cases and that sort of thing was a snap back then.

Jon: So their function was only to change the design in as much as it would interface with PAL?

Steve: Well, changing the design to interface with PAL is not an easy project. Yeah, there were major changes.

Jon: But in no sense did they alter the major functions and controls?

Steve: Yeah, just to get the thing to work. I don’t know if we used that chip again, either. It was the same 1445. I still have some of those cards around. We built extra cards, and this unit that's out in the (coast?) right now was built with those. You could switch it between PAL and NTSC by varying some of the filter parameters and the burst flipping circuit which we simply took out of . . . And we never built a proc amp for it; we never put them in hard, because the Australian one used a switcher and later on we used a Proto-board. Finally we made some cards up on actual breadboards. But the first NTSC one literally a Prototype board: all it did was add burst, because it filtered it off coming in and added it coming out. And we didn't strip sync because we didn’t see any advantage to doing that. It was just one thing to go wrong.